Multi-axis Stepper Motor Controller

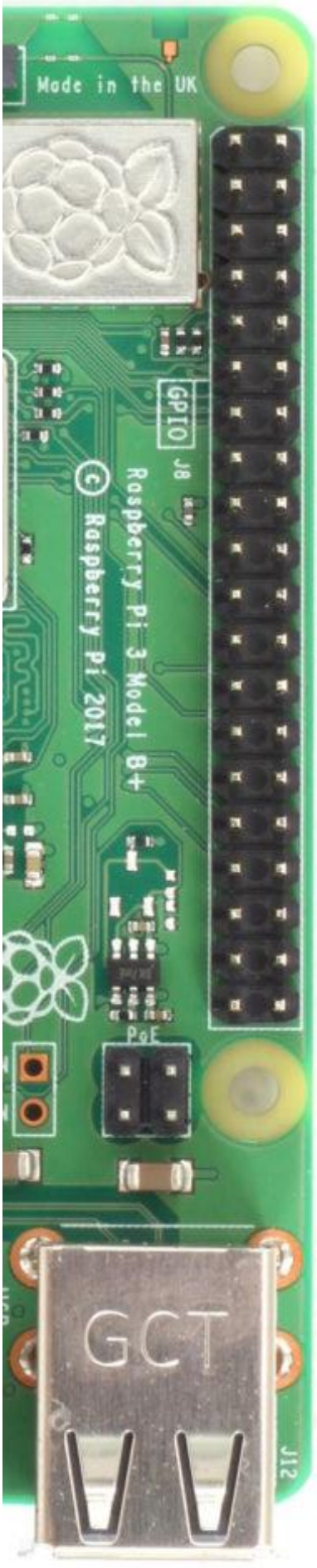
S. No	Parameter	Description
•	Hardware Platform	Raspberry Pi 4B
•	Software Platform	C/C+ or Python
•	Display	7 Inches Display with HDMI
•	Keyboard	Touch with USB
•	Power Input	5V – Raspberry, 12V - Motors
•	Motor	Stepper, Bipolar, 12V, 1.8 degree
•	No of Motors	Eight
•	Motor Control Signals	Direction, Clock, Enable
•	Driver board	TB6600
•	Motor Setting (user Selectable)	Speed in RPM, CW/CCW, Run/Stop
•	Master Control	Stop or Pause All motors
•	GUI	Simple and easy to use
•	Special	All Motors can run simultaneously
•	Feedback	No, in Future Encoder
•	Optional (Future)	Position, step size, direction and no of steps
•	Others/Remarks	May pop-up during development
•	Maximum Speed	500 steps / sec -> 2.5 Rev/sec -> 100 rpm

Below is GUI Image in 7 inches display as tabular format.

Robotics Arm Controller V0.1													
Motor 1		Motor 2		Motor 3		Motor 4		Motor 5		Motor 6		Motor 7	
- Speed +		- Speed +		- Speed +		- Speed +		- Speed +		- Speed +		- Speed +	
CCW	CW	CCW	CW	CCW	CW	CCW	CW	CCW	CW	CCW	CW	CCW	CW
On/Off		On/Off		On/Off		On/Off		On/Off		On/Off		On/Off	
						Master On/Off							

- Speed can change in rpm, its format is – XXX +. The plus and minus sign press are used for change in speed
- Selected Direction will be Highlighted color.
- On/Off is toggle message, based on current state of motor.
- Master on/off is toggle button. This button will master to enable or disable all the motors.
- Each Motor has control Signal – Direction (High – CW, Low – CCW), Clock/Step Pulse (50% duty Cycle, normally low). The Enable signal will be common to all the Motor, active high from RPi.

GPIO definition for Motors				
Motor	Direction (GPIO)	Raspberry header Pin Number	Pulse (GPIO)	Raspberry header Pin Number
Motor 1	GPIO 6	22	GPIO 13	21
Motor 2	GPIO 31	28	GPIO 26	32
Motor 3	GPIO 12	19	GPIO 16	10
Motor 4	GPIO 30	27	GPIO 21	29
Motor 5	GPIO 23	33	GPIO 24	35
Motor 6	GPIO 27	36	GPIO 22	31
Motor 7	GPIO 4	16	GPIO 3	15
Enable All	Always Enabled			



3V3 Power	1	2		**5V** Power
GPIO2 SDA1 I2C	3	4		**5V** Power
GPIO3 SCL1 I2C	5	6		**Ground**
GPIO4 1-wire	7	8		**GPIO14** UART0_TXD
Ground	9	10		**GPIO15** UART0_RXD
GPIO17	11	12		**GPIO18** PCM_CLK
GPIO27	13	14		**Ground**
GPIO22	15	16		**GPIO23**
3V3 Power	17	18		**GPIO24**
GPIO10 SPI0_MOSI	19	20		**Ground**
GPIO9 SPI0_MISO	21	22		**GPIO25**
GPIO11 SPI0_SCLK	23	24		**GPIO8** SPI0_CE0_N
Ground	25	26		**GPIO7** SPI0_CE1_N
ID_SD I2C ID EEPROM	27	28		**ID_SC** I2C ID EEPROM
GPIO5	29	30		**Ground**
GPIO6	31	32		**GPIO12**
GPIO13	33	34		**Ground**
GPIO19	35	36		**GPIO16**
GPIO26	37	38		**GPIO20**
Ground	39	40		**GPIO21**